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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,667	11/25/2003	Bosco P. Ho	7593-CO1	5949

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Patent Licensing Department
Nalco Company
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Naperville, IL 60563-1198

EXAMINER	
FERNANDEZ, SUSAN EMILY	
ART UNIT	PAPER NUMBER
1651	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/721,667	HO ET AL.	
	Examiner	Art Unit	
	Susan E. Fernandez	1651	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The amendments filed December 18, 2006, have been received and entered.

Claims 1-17 are pending and examined on the merits.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite since it recites "at least two of the feed stream, the concentrate stream and the concentrate stream" at lines 6-8. First, the recitation of "the concentrate stream" lacks antecedent basis since line 3 of the claim recites that there is at least a first stream and a second stream, without any mention of a concentrate stream. Moreover, the recitation "the concentrate stream" appears twice. Additionally, lines 13-15 recite "at least two of the feed stream, the permeate stream, and the concentrate stream," where "the permeate stream" lacks antecedent basis as the claim only recites formation of at least a first stream and a second stream. Thus, claims 1-17 are rejected under 35 U.S.C. 112, second paragraph.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being obvious over Chattoraj et al. (US Pat. 6,329,165) in view of Ridgway et al. (Water Treatment Membrane Processes, McGraw Hill, 1996, pages 6.1-6.62) and McNeel et al. (US 6,180,056).

Chattoraj et al. discloses a method for monitoring planktonic and sessile microbiological populations (i.e. biofouling) in an industrial water system. Chattoraj et al. teaches the same method steps as claimed in the present application, using the same fluorogenic agents (see claims 1-15; column 2, lines 30-67; column 3, lines 1-54; column 4, lines 7-34; column 5, lines 6-31, 63-64; column 6, lines 42-45; and column 7, lines 64-67 of Chattoraj et al.). Note that Chattoraj et al. indicates that commercially available fluorometers are suitable for the practice of their invention for detecting the fluorogenic agent (column 6, lines 42-45). In regards to the amount of fluorogenic agent used, Chattoraj discloses that "an effective amount of fluorogenic dye is

between about 0.005 ppm and about 1.0 ppm, preferably between about 0.02 ppm and about 0.5 ppm, most preferably between about 0.04 ppm and about 0.1 ppm, and the most highly preferable amount of fluorogenic dye is 0.05 ppm" (column 5, lines 41-46). These ranges clearly fall within the ranges as claimed in claims 6-8 of the instant application.

Chattoraj et al. does not expressly disclose that: 1) the method is usable on a reverse osmosis membrane separation system such as those claimed in the instant application, and 2) biocontrol agents or biocontrol methods can be used to control biofouling (Chattoraj et al. only teach the use of oxidizing and non-oxidizing biocides, see claims 5-13).

However, Ridgway et al. teaches that membrane separation processes such as reverse osmosis play essential roles in modern water treatment practice (page 6.1, lines 1-3). Additionally, membrane biofouling is a widespread problem in these treatment processes, especially in feedwater and industrial processes such as ground-water treatment, seawater desalination, and water production (i.e. in industrial water systems). See section 6.5 "Occurrence of membrane biofouling" on pages 6.20-6.21. Additionally, applicant has disclosed that membrane separation methods such as reverse osmosis are used in industrial processing of liquid streams, such as in water purification (page 1, lines 6-7 of the instant specification). Ridgway et al. also teaches that various options are available to control biofouling. Examples include the use of biocides, biocontrol agents (such as chelating agents, surfactants, and chaotropic agents), and biocontrol methods (such as ultrasound, electric fields, and air backwashes). See Table 6.4 on page 6.43.

Therefore, since reverse osmosis is commonly used in industrial water systems, as taught by Ridgway et al., it would have been obvious to use the method of Chattoraj et al. and apply it

to reverse osmosis membrane separation systems. Although Chattoraj et al. only discloses the use of biocides as a means to control biofouling, it would have been obvious to modify that aspect of the method to include the use of other biocontrol agents and methods since these other venues are also known and practiced in the art, as disclosed by Ridgway et al.

Additionally, Chattoraj et al. differs from the claimed invention in that it does not require that the fluorescent signal is measured in at least two of the feed stream, the permeate stream, and the concentrate stream.

McNeel et al. discusses biofouling that occurs in reverse osmosis (RO) systems (column 1, lines 17-42). For reducing biofouling, McNeel et al. teaches introducing a biocide into the aqueous system which uses the separation membrane (abstract). To determine the effectiveness of the biocide in reducing biofouling, bacteria counts of the feed, permeate, and concentrate streams were taken (column 7, lines 61-65).

At the time the invention was made, it would have been obvious to the person of ordinary skill in the art to have carried out fluorescent signal measurements at the feed, permeate, and concentrate streams in the Chattoraj invention performed on a reverse osmosis system. One of ordinary skill in the art would have been motivated to do this since bacteria counts of the feed, permeate, and concentrate streams of a reverse osmosis system had been shown to be required for determining the extent of biofouling and effect of added biocide, as taught in McNeel et al. Moreover, as bacteria may be present in these three streams (as pointed out in McNeel et al.), it would have been obvious to have taken fluorescent signal measurements of these three streams since the Chattoraj invention is for monitoring microbial populations in an industrial water system and using such determinations to control the amount of biocide added to said industrial

water system (column 2, lines 23-27). Clearly, the bacterial content of the various streams must be monitored in controlling the amount of biocide added to an industrial water system with reverse osmosis membranes. Thus, a holding of obviousness is clearly required.

Claims 1-14, 16, and 17 are rejected under 35 U.S.C. 103(a) as being obvious over Zeiher et al. (US 6,838,002) in view of Chattoraj et al.

Zeiher et al. discloses a method for monitoring a reverse osmosis membrane separation process wherein an inert fluorescent tracer and a tagged fluorescent agent are produced and introduced into the feed stream and a fluorometer is used to determine the amounts of the inert fluorescent tracer and the tagged fluorescent agent in at least one of the feed stream, the first stream, and the second stream (claim 1). Furthermore, at least one process parameter is evaluated based on the amounts of the inert fluorescent tracer and the tagged fluorescent agent measured (claim 2), and the amounts of these agents (claims 13-15) meet the limitations recited in instant claims 6-8. Note that Zeiher et al. discloses that the disclosed invention can be used for industrial water uses such as the use of membranes to exclude harmful microorganism from drinking water (column 25, line 10-18). Furthermore, biofouling agents may be used to treat the membranes of the system (column 20, lines 40-57).

Zeiher et al. differs from the claims under examination in that Zeiher et al. does not expressly disclose that the reverse osmosis membrane separation process being monitored is biofouling, or that the tagged fluorescent agent reacts with at least one microorganism (planktonic or sessile) within the reverse osmosis so that reacted tagged fluorescent agent is measured. Moreover, the reference does not teach that the fluorescent agent is any of those

recited in instant claims 3-5, nor does it teach the determination of ratios, rate of change of a ratio, or optimal amount of biocontrol treatment. Finally, Zeiher et al. does not expressly disclose the biocontrol treatments recited in instant claims 12-14.

Chattoraj et al. discloses a method for monitoring planktonic and sessile microbiological populations (i.e. biofouling) in an industrial water system. Chattoraj et al. teaches the same method steps as claimed in the present application, using the same fluorogenic agents, and requiring the measurement of reacted fluorogenic agents and the determination of ratios, rate of change of a ratio, and optimal amounts of biocontrol treatment as recited in the claims under examination (see claims 1-15; column 2, lines 30-67; column 3, lines 1-54; column 4, lines 7-34; column 5, lines 6-31, 63-64; column 6, lines 42-45; and column 7, lines 64-67 of Chattoraj et al.). Note that Chattoraj et al. indicates that commercially available fluorometers are suitable for the practice of their invention for detecting the fluorogenic agent (column 6, lines 42-45). Chattoraj et al. also teaches the limitations relating to biocontrol recited in instant claims 11-14 (see claims 5-13 and column 7, line 60 through column 8, line 65).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have adapted the methods of Zeiher et al. for the assessment of biofouling as disclosed in Chattoraj et al. One of ordinary skill in the art would have been motivated to do this since Zeiher et al. teaches a known industrial water system wherein biofouling occurs. Given that Chattoraj et al. is suitable for monitoring planktonic and sessile microbiological populations in a water system, there would have been a reasonable expectation of success in using the same fluorogenic agents, steps of assessing reacted fluorogenic agents and determining optimal

amount of biocontrol treatment as disclosed in Chattoraj et al. in practicing the Zeiher methods. A holding of obviousness is clearly required.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5 and 9-17 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 6,329,165 B1 (Chattoraj et al., document AG of the present IDS) in view of Ridgway et al., 1996 (document

AP of the present IDS) and McNeel et al. Although conflicting claims are not identical, they are not patentably distinct from each other. Claims 1-5 and 9-17 of the instant application are directed to a method of monitoring biofouling in a membrane separation system comprising the steps of: a) adding a fluorogenic agent into the system; b) allowing the fluorogenic agent to react with microorganisms (e.g. planktonic microorganisms and sessile microorganisms) in the system to form a reacted fluorogenic agent; c) providing a fluorometer to measure fluorescence; d) measuring the fluorescent signals of the fluorogenic agent and the reacted fluorogenic agent; e) monitoring biofouling in the system by determining a ratio of the fluorescent signal of the reacted fluorogenic agent to the unreacted fluorogenic agent; and f) determining the rate of change of the fluorescence ratio. The method of the instant application is limited to membrane systems such as cross-flow or dead-end flow membrane systems, examples include reverse osmosis, nanofiltration, ultrafiltration, microfiltration, inter alia. Fluorogenic agents usable in the claimed method include resazurin, 4-methylumbelliferyl phosphate, pyranine phosphate, and others. The method also comprises steps for controlling biofouling by way of biocontrol treatments such as the use of biocides, biocontrol agents or biocontrol methods. Additionally, an inert fluorescent tracer can be included.

Chattoraj et al. (in claims 1-15) discloses a method for monitoring planktonic and sessile microbiological populations (i.e. biofouling) in an industrial water system comprising the steps of: a) adding a fluorogenic agent into the system; b) allowing the fluorogenic agent to react with any planktonic microorganisms and sessile microorganisms in the system to form a reacted fluorogenic agent; c) providing a means for measuring fluorescence (i.e. a fluorometer); d) measuring the fluorescent signals of the fluorogenic agent and the reacted fluorogenic agent and

calculating the ratio of the signals; e) monitoring biofouling in the system by determining a ratio of the fluorescent signal of the reacted fluorogenic agent to the unreacted fluorogenic agent; f) determining the rate of change of the fluorescence ratio; g) determining the optimal amount of biocide to add to the system based on the ratio or rate of ratio change; and h) delivering the optimal amount of biocide into the system. Fluorogenic dyes usable include resazurin, 4-methylumbelliferyl phosphate, and pyranine phosphate. Additionally, an inert fluorescent tracer can be included. Chattoraj et al. does not expressly disclose that: 1) the method is usable on membrane separation systems such as those claimed in the instant application, and 2) biocontrol agents or biocontrol methods can be used to control biofouling (Chattoraj et al. only teach the use of oxidizing and non-oxidizing biocides). However, Ridgway et al. teaches that membrane separation processes such as reverse osmosis, microfiltration, nanofiltration and ultrafiltration, play essential roles in modern water treatment practice (page 6.1, lines 1-3). Additionally, membrane biofouling is a widespread problem in these treatment processes, especially in feedwater and **industrial** processes such as ground-**water treatment**, seawater desalination, and **water production** (i.e. in industrial water systems). See section 6.5 "Occurrence of membrane biofouling" on pages 6.20-6.21. Ridgway et al. also teaches that various options are available to control biofouling. Examples include the use of biocides, biocontrol agents (such as chelating agents, surfactants, and chaotropic agents), and biocontrol methods (such as ultrasound, electric fields, and air backwashes). See Table 6.4 on page 6.43.

Therefore, since membrane separation systems are commonly used in industrial water systems, as taught by Ridgway et al., it would have been obvious to use the method of Chattoraj et al. and apply it to membrane separation systems. Although Chattoraj et al. only disclose the

use of biocides as a means to control biofouling, it would have been obvious to modify that aspect of the method to include the use of other biocontrol agents and methods since these other venues are also known and practiced in the art, as disclosed by Ridgway et al., supra.

Furthermore, it would have been obvious to have taken fluorescent signal measurements of the feed, permeate, and concentrate streams of the reverse osmosis membrane system since bacteria is suspected of being present in these streams when biofouling occurs, as demonstrated by bacterial count measurements performed on such a water system in McNeel et al. (column 7, lines 61-65).

Thus, a double patenting rejection is required.

Claims 1-17 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-19 of U.S. Patent No. 6,699,684. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application reads on a membrane separation method which is recited in `684 claims 3 and 4. Therefore, the claims under examination are properly considered obvious over the patented claims. Note that no terminal disclaimer had been filed, thus the rejections must be maintained.

In the previous office action, claims 1-17 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-13, 16, 18-20 of copending Application No. 10/740336. Since Application No. 10/740336 was abandoned on December 11, 2006, these rejections are hereby withdrawn. However, should 10/740336 be revived, these rejections may be reinstated.

Response to Arguments

Applicant's arguments filed December 18, 2006, have been fully considered but they are not persuasive. The claims have been newly amended to recite that the fluorescent signal is measured in "at least two" of the feed stream, the permeate stream, and the concentrate stream, thus necessitating the new grounds of rejection over the additional reference, McNeel et al. Though previous methods teach extracting the membrane in monitoring biofouling, the combination of Chattoraj et al. with Ridgway et al. and McNeel et al. does not teach this as the methods of Chattoraj et al. teach measuring bacteria in the water. Moreover, Chattoraj et al. points out using in-line measurement for the practice of its methods, wherein in-line measurement is "one that is taken without interrupting the flow of the system being measured" (column 6, lines 64-65). As Chattoraj et al. teaches an in-line measurement, Chattoraj et al. does not teach removal of any component of the system, including any membrane.

Further still, applicant asserts that because of a membrane systems' propensity to foul with small amounts of biological material, one of ordinary skill in the art would not necessarily expect the analytical sensitivity of the methodology of Chattoraj be applied to monitoring fouling in a membrane separation system. However, as the Chattoraj invention takes measurement of the fluorescent signal in the water system itself, and not in the membranes themselves, it is unclear how the propensity of the membrane system to foul would have affected the sensitivity of the Chattoraj invention in monitoring microbiological populations in the system.

Thus, the rejections (under 35 U.S.C. 103(a), and under the judicially created doctrine of obviousness-type double patenting) over Chattoraj et al., Ridgway et al., and McNeel et al. are required.

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susan E. Fernandez whose telephone number is (571) 272-3444. The examiner can normally be reached on Mon-Fri 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Wityshyn can be reached on (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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